Lead Poisoning in Nonhuman Primates

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**Synonyms.** Plumbism, saturnism.

**Gross Appearance**

Nonhuman primates chronically poisoned by inorganic lead have pale mucous membranes as a result of microcytic hypochromic anemia. The anemia, a sequela of lead interference with hemoglobin synthesis, is usually associated with stippled immature erythrocytes (Fig. 173). The gums near the teeth may display a thin black line (Burtonian or lead line) in adults with poor dental hygiene (Fig. 174). The long bones of juvenile primates accumulate lead and may develop radiopaque, dense, gray-white bands in the metaphyses (Fig. 175 and Fig. 176). These lesions are not seen in adults poisoned after long bones cease growing. Where lead-containing paint is a source of poisoning, radiopaque paint chips may be seen in the digestive tract on abdominal films or in the ingesta at necropsy. The brains of juveniles poisoned by lead are often edematous with flattened gyri and narrowed sulci (Fig. 177).
Lesions induced by lead in long bones of growing primates are characterized by a dense band in the metaphyses composed of many thick trabeculae of mineralized cartilage bearing a superficial layer of bone. Between the abnormal thick trabeculae are numerous large chondroclasts and osteoclasts (Fig. 178). The multiple nuclei of the altered osteoclasts may contain small eosinophilic and acid-fast inclusion bodies. The kidneys also contain a high concentration of lead, which primarily affects the proximal tubules often causing proteinuria and sometimes glycosuria. Renal tubular cells become swollen and many nuclei become enlarged, containing one or more acidophilic, acid-fast, inclusion bodies (Fig. 179). Some tubular cells appear to shrink; the cytoplasm and the nucleus become densely stained and these necrotic cells slough into the lumen as regenerating epithelial cells form beneath them. The inclusion bodies contain a lead-protein complex and may be seen in various tissues (Osheroff et al. 1982) and in sloughed renal epithelial cells in urine sediment (Colle et al. 1980; Zook et al. 1980a,b). The liver often contains enlarged hepatocyte nuclei with acid-fast inclusion bodies (Fig. 179). The number and size of hepatic inclusions tend to correlate positively with the concentration of lead in the liver. Other hepatic changes are less consistent but include fatty change (may be associated with anemia) and hemosiderosis. Nodular hyperplasia and portal fibrosis have been reported in a few primates (Hruban et al. 1986). Degenerative and atrophic changes also occur in the ovaries and testes of adults.